A NEW SPECIES OF *CAREX* (CYPERACEAE: *PHAESTOGLOCHIN*) FROM OKLAHOMA AND TEXAS; TYPIFICATION OF SECTION *PHAESTOGLOCHIN*, AND NOTES ON SECTIONS *BRACTEOSAE* AND *PHAESTOGLOCHIN*

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ABSTRACT

Carex perdentata, is described from Palo Pinto County, Texas. A key to the species of section *Phaestoglochin* occurring in Arkansas, Louisiana, Oklahoma, and Texas is included. *Carex*, section *Phaestoglochin* is here with lecto-typified with *C. muricata*. The South American section *Bracteosae*, often considered synonymous with section *Phaestoglochin*, is considered distinct.

RESUMEN

Se describe *Carex perdentata*, sección *Phaestoglochin* del condado de Palo Alto, Texas. Se incluye una clave para las especies de la sección *Phaestoglochin* que viven en Arkansas, Louisiana, Oklahoma y Texas. Se lectotipifica la sección *Phaestoglochin* del género *Carex* con *C. muricata*. La sección sudamericana *Bracteosae*, considerada a menudo como sinónima de la sección *Phaestoglochin* se considera distinta.

Carex section *Phaestoglochin* [Sy = section *Bracteosae sensu* Mackenizie (1931), non Pax], subgenus *Vignea* (P. de Beauvois *ex* Lestiboudois f.) W. Petermann was described from Europe by Dumortier in 1827. This section now includes 27 species. However, most of the taxa are native to the New World. Today, all of the European species have been introduced into North America. Their distribution in the New World is primarily in temperate North America. However one species, *C. xalapensis* C. Kunth, is found in México and northern Guatemala. Section *Phaestoglochin* is characterized by 1) an inflorescence with 3–25 sessile spicate branches, frequently with ten or less branches, the lower branches occasionally being compound in certain taxa (especially *C. muehlenbergii* C. Schkuhr *ex* C. Willdenow var. *enervis* W. Boott); 2) spikes androgynous, rarely pistillate, or having short staminate spikelets arising laterally from an androgynous or pistillate spike; 3) perigynia plano-convex or unequally biconvex, with the bodies of the perigynia more or less abruptly contracted into a beak; 4) achenes two-sided, either lenticular or slightly biconvexed; 5) style jointed with the achene; 6) stigmas two. Since section *Phaestoglochin* has never been typified, *C. muricata*

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L. is here designated as the type for section *Phaestoglochin*. The typification of *C. muricata* has been reviewed by Reznicek and Ball (1980).

Section *Bracteosae* F. Pax differs from section *Phaestoglochin* by 1) a denser inflorescence with more spikes; 2) perigynia with a spongy area at the basal end of the ventral surface, occasionally on the dorsal surface as well; 3) and usually with wart-like bumps over the lower part of the ventral surface and sometimes across the dorsal surface of the perigynia. Kunth (1837) was the first to use the name *Bracteosae* as an infrageneric category, but without rank or description. Pax (1889) published *Bracteosae* at the sectional rank and provided a scant and ambiguous, but valid description. Pax did not cite Kunth, giving authorship of section *Bracteosae* solely to himself. Pax cited *Carex cephalophora* Muhlenberg *ex* Willdenow of North America as belonging to this section. This is undoubtedly where Mackenzie (1931) got his concept that the North American taxa that he treated belonged to section *Bracteosae*. Kükenthal (1909) recognized the North American taxa that Mackenzie (1931) recognized as section *Bracteosae* as section *Mulhlenbergianae,* a superfluous name for section *Phaestoglochin*, and recognized the South American taxa as belonging in a section distinct from those in North America.

While researching the following complex of species in section *Phaestoglochin*; *C. austrina* (J. Small) K. Mackenzie, *C. cephalophora* H. Muhlenberg ex C. Willdenow, *C. leavenworthii* C. Dewey, *C. mesochorea* K. Mackenzie, *C. muehlenbergii* Schkuhr *ex* Willdenow var. *enervis* W. Boott, and *C. muehlenbergii* C. Schkuhr ex C. Willdenow var. *muehlenbergii*, a new species of *Carex* (*C. perdentata* S.D. Jones) was discovered.

Means, variances, standard deviations, and ranges were measured for nine populations consisting of 10 plants per population. Additional specimens were examined but no measurements were found to lie outside of the range recorded for the nine populations. The mean, plus and minus two standard deviations, for all parametric data is presented in the species description. If the ranges extend beyond the mean, plus or minus two standard deviations, then the extension is listed as parenthetical. Fruiting dates are based on a statistical mean, plus and minus two standard deviations. Ranges greater than and/or lesser than the two standard deviations are listed as parenthetical.

Carex perdentata S.D. Jones, sp. nov. (Fig. 1)

Plantae cespitosae: culmis fertilis (17–0–)26.8–74.2(–90.0) cm altis. Foliis (4–)5–9, laminis (18.0–)20.6–46.4(–55.5) cm longis, 2.2–4.5(–4.6) mm latis; paginis adaxialibus papillosis; vaginis arctis. Inflorescentiis (5–)6–12(–14) androgyniis spicis, 13.5–25.3(–28.0) mm longis, (9.0–)9.5–14.5 mm latis. Perigynio (3.3–)3.4–5.2(–5.6) mm longo, 1.9–2.7(–2.8) mm lato, lenticularis, sine venae vel 1–5(–8) tenuis venae ventraliter; sine venae vel 1–10(–11) tenuis venae dorsaliter. Achaeniis 1.8–2.6(–2.8) mm longis, 1.5–2.1(–2.2) mm latis, lenticularis, ovatis. Stigmatibus 2, rubellus-brunneis, brevis; antheris (1.3–)1.4–1.8(–1.9) mm longis.

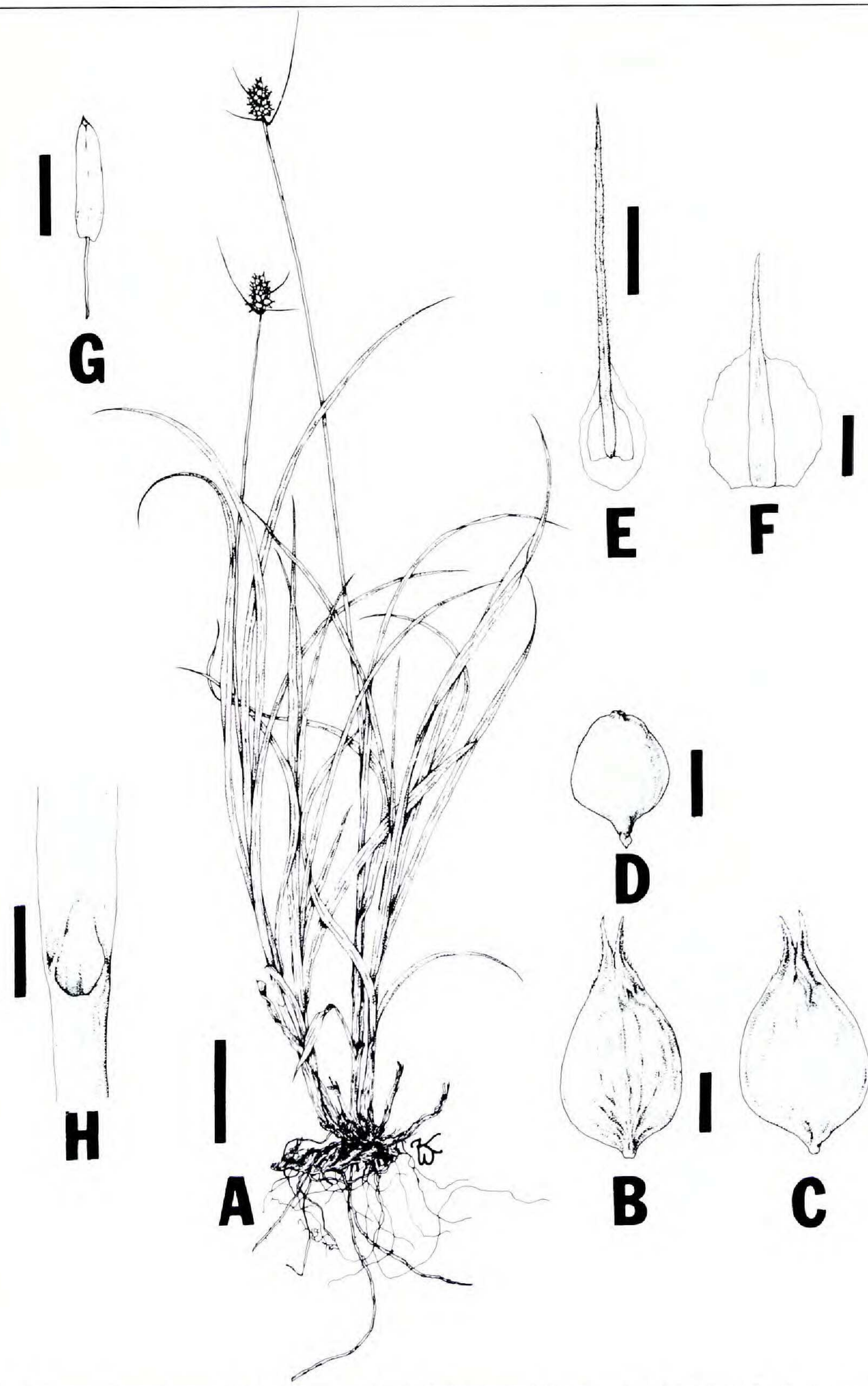

FIG. 1. *Carex perdentata* (*S.&G. Jones 8349*, holotype and isotypes). A. Habit. B. Perigynium, dorsal view. C. Perigynium, ventral view. D. Achene. E. Spke bract. F. Pistillate scale. G. Anther. H. Sheath and ligule. Bar equals 5 cm in A, 5 mm in E, 1 mm in B, C, D, F, G, and H.

Habit perennial, cespitose; *rhizomes* short to long, dark brown to black, fibrillose; *fertile culms* (17.0–)26.8–74.2(–90.0) cm tall, erect, stiff, 2.0–3.2 (–3.8) mm wide ca. 2 cm above rootstock, sharply triangular, scaberulous above, leafy on lower third, conspicuously exceeding leaves; *leaves* with well-developed blades (4–)5–9 per fertile culm; hypostomous; *blades* (18.0–)20.6–46.4(–55.5) cm long, 2.2–4.5(–4.6) mm wide, erect-ascending to slightly arching, thick, light green, flat, long-acuminate, margins antrorsely serrulate; *abaxial surface* without papillae or papillose distally; midvein raised, becoming increasingly more antrorsely scabrous distally; epidermal cells rectangular and raised above the braided patterned cell walls; *adaxial surface* papillose, papillae arising perpendicular from distal end of embedded clavate shaped epidermal cells (Fig. 2); *stomata* narrowly elliptic-oblong, paracytic with subsidiary cells mostly triangular with some semicircular in shape; sunken below adjacent epidermal cells, restricted to intercostal zones on abaxial surface; *sheaths* tight around culm; *dorsal sheath surface* not septate-nodulose or rarely inconspicuously septate, papillose, pale green; *ventral sheath surface* whitish-hyaline, striate, papillose (at least proximally), deeply concave and more or less callused at apex of distal end, yellowish-brown tinged; *ligule* 0.4–1.9(–2.5) mm long, membranous, more or less linguiform, or infrequently acute at apex; *inflorescences* of (5–)6–12(–14) androgynous spikes, 13.5–25.3(–28.0) mm long, (9.0–)9.5–14.5 mm wide, usually 0.5–2.5(–3) times as long as wide, but occasionally as wide as long; *lateral spike* second from bottom (4.5–)4.7–7.9(–8.0) mm long; *staminate* flowers few, with ovate-lanceolate cuspidate scales; *lowest inflorescence bract* 7.0–56.6(–105.0) mm long including awn, pistillate scale-like but with larger and conspicuously longer awns; *upper bracts* pistillate scale-like but with longer awns, mid-point of awns 0.1–0.5(–0.9) mm) wide; *lateral branch*, second from bottom (spike) (4.5–)4.7–7.9(–8.0) mm long; *gap* (internode) between the lowest two spikes (0.5–)0.7–3.5(–4.2) mm; *pistillate scales* (1.6–)1.8–3.1 mm long, 1.4–2.0(–2.2) mm wide, 1-veined, rarely 3-veined, ovate, brownish or greenish-hyaline, narrower than and (excluding awn) about length of bodies of perigynia, apex usually conspicuously awned (rarely acuminate), awn (0–)0.1–3.6 mm long , green mid-stripe, 0.2–0.4(–0.5) mm wide; *perigynia* (3.3–)3.4–5.2(–5.6) mm long, 1.9–2.7(–2.8) mm wide, (2–)4–19(–24) per spike, ascending or at maturity spreading, flattened-plano-convex, ovate, round-tapering and often slightly spongy at base, ventral perigynia surface veinless, or 1–5(–8) fine veins, dorsal perigynia surface veinless or 1–10(–11) fine veins, submembranous, sharp-edged to base, serrulate above middle, tapering or abruptly contracted into a serrulate beak, beak bidentate, sutures conspicuous; *teeth* (1.0–)1.4–1.7(–1.8) mm long, narrowly-triangular; *achenes* 1.8–2.6(–2.8) mm long, 1.5–2.1(–2.2) mm wide, lenticular, strongly flattened, ovate (Fig. 3) to suborbicular, substipitate 0.1–0.3 mm long, minutely apiculate, occasionally retuse at apical end; epidermal cells are nonisodymetric; single

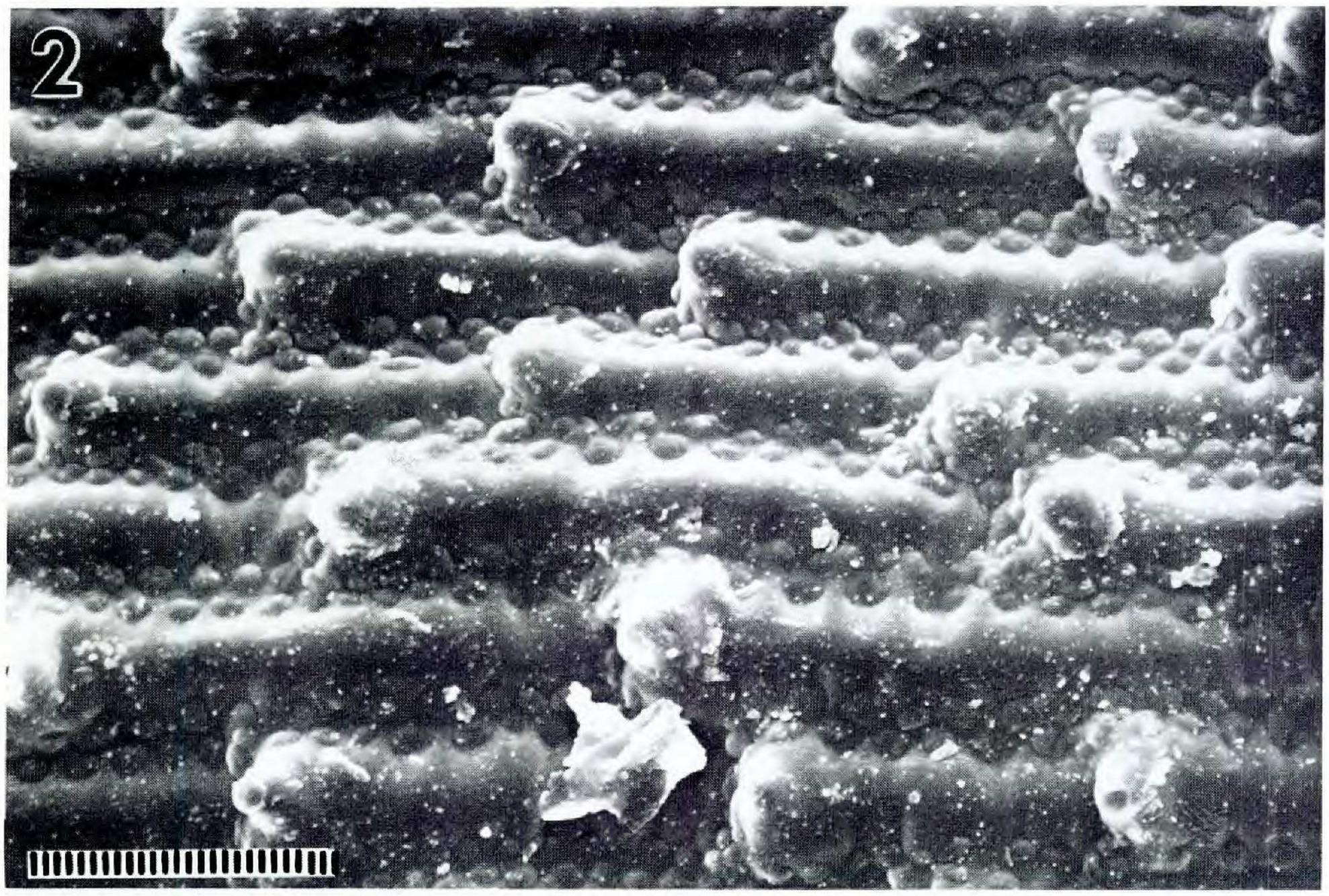

FIG. 2. *Carex perdentata*, SEM micrograph (*S.& G. Jones 8349*, isotype: TAES). Adaxial leaf surface showing papillae arising perpendicular from the distal end of embedded clavate shaped epidermal cells. Bar equals 50 m.

large central silica body and no satellites perched on edge of silica platform (Fig. 4); central body occasionally composed of two fused bodies; *style* straight, short, slender, enlarged at base, jointed with achene; *stigmas* two, reddish-brown, short; *anthers* (1.3–)1.4–1.8(–1.9) mm long; *chromosome number* unknown; *fruiting* (13 Mar-) 21 Mar - 1 Jun (-12 Jun); *ecology* a facultative sciophyte, primarily in alfisols or inceptisols with sandy or sandy loam soil, sandstone outcrops, granitic outcrops, or thin soil over limestone, open mesic to submesic hardwood forests, or open hardwood-juniper forests, or woodlands in savannas in granite outcrops; elevation 175–525 m; *distribution* (Fig. 5), central Texas north to Oklahoma; *economic importance* forage value for livestock is low in palatability but is of use for wildlife, especially for rabbits, rodents, deer, and birds; it is also important in soil erosion.

TYPUS: U.S.A. TEXAS. Palo Pinto Co.: 2.3 mi S on FR 4 from its jct. with FR 3137, S of Palo Pinto, mesic to submesic live oak dominated W-facing slope with reddish sandy loam soil and sandstone, 23 Apr 1992, *S. & G. Jones 8349* (HOLOTYPE: MICH; ISOTYPES: BRIT, MO, OKL, SAT, TAES, TEX, US, VDB, WARM).

Additional specimens: OKLAHOMA. **Comanche Co**: 1.3 mi N of Meers along W side of Rt. 115, lightly shaded, moist soil along trail through deciduous forest, frequent, 15 May 1990, *Naczi 2414 B* (MICH). **Cleveland Co**.: low, damp, ground, 28 May 1939, *Bebb 4085*

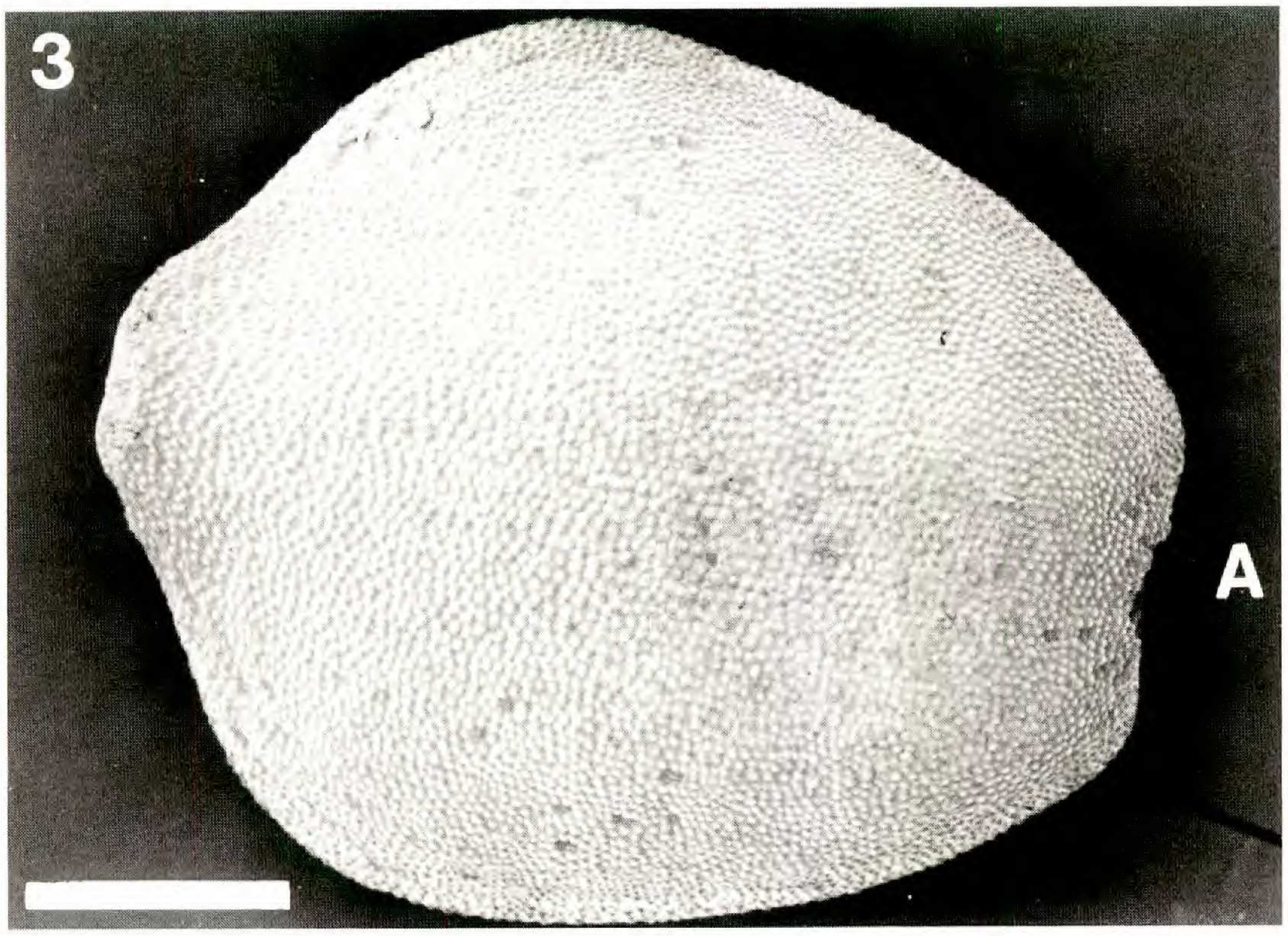

FIG. 3. *Carex perdentata*, achene, SEM micrograph (*S.&G. Jones 8349*, isotype: TAES). A. Apical end. Bar equals 0.5 mm.

(OKL). **Sequoyah Co.**: below Dwight Mission, 6 mi NE of Sallisaw; creek woods, 7 May 1955, *Wallis 2058* (BEBB).

TEXAS. **Bell Co.**: 2.1 mi N on TX 95 from its jct. with FR 228, then 2.8 mi NE on Sunshine Rd. from its jct. with TX 95, mesic open to wooded roadside with graveley clay soil, 14 Apr 1990, *S. & G. Jones 4340* (BRIT/SMU, ctb, MICH, MO, SAT, TAES, TEX, US, VDB, WARM). **Bexar Co.**: San Antonio, 22 Apr 1911, *Clemens and Clemens 386* (CAS). **Bosque Co.**: 3.3 mi NW of Clifton, limestone gravel and silt, Meridian Creek bank, under trees, 16 Apr 1953, *Shinners 14241* (BRIT/SMU). **Burnet Co.**: NE corner of US 281 and RR 2147 in Marble Falls, mesic roadside roadcut and adjacent oak savanna with granitic soil, 30 Mar 1992, *S. & G. Jones 8213* (BRIT/SMU, ctb, MICH, MO, SAT, TAES, TEX, US, VDB, WARM). **Colorado Co.**: 3/4 mi NW of Columbus, frequent in open woods on terrace of Colorado River, 9 Apr 1948, *Cory 54275* (BRIT/SMU). **Comal Co.**: 1850, *Lindheimer 8100 and Dapprube* (BRIT/SMU). **Cooke Co.**: N of Leo near Dickson Creek, Western Cross Timbers, alluvial soil, 4 May 1946, *Whitehouse 15651* (BRIT/SMU). **Dallas Co.**: SW corner of Coit Rd. and Belt Line Rd., Stults Prairie, in depressions, 3 May 1960, *Correll 23374* (BRIT/SMU). **Erath Co.**: Morgan Mill, 12 Jun 1941, *Tharp 43330* (UC). **Fayette Co.**: E of Kreiche House, Monument Hill State Park, La Grange West Quad., in moist sandy loam soil over calcareous sandstone on mown lawn, 15 Mar 1986, *Carr 7169 and Kutac* (TAES). **Frio Co.**: Rt. 1581 from Pearsall to Divot at Frio River crossing, dense herbaceous growth in shade of trees, loam soil, elev. ca. 151 m, 13 Mar 1985, *Ertter 5570 and Bear* (CAS). **Gillespie Co.**: along stream in NE corner of county W of Coal Creek, common on N slope under oaks, 29 Apr 1959, *Correll 21168 and Johnston* (BRIT/SMU, MO, UC). **Hayes Co.**: San Marcos, dry rocky ground, 17 Apr 1917, *Palmer 11587* (UC). **Hill Co.**: 7 mi WSW of Whitney, in detritus under limestone cliffs above dam, in tufts, 15 Apr

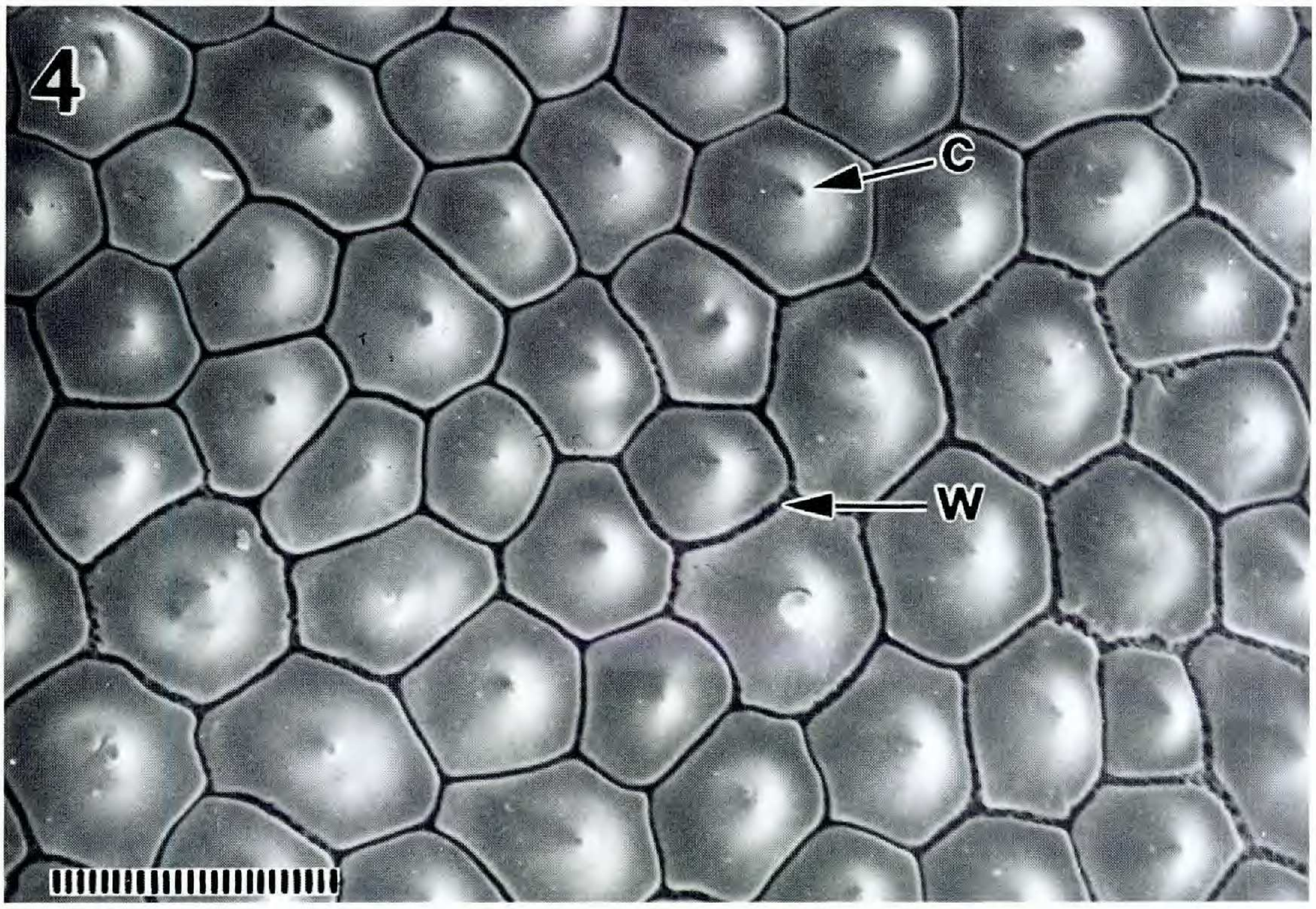

FIG. 4. *Carex perdentata*, epidermal cells, SEM micrograph (*S.&G. Jones 8349*, isotype: TAES). C. Central body. W. Anticlinal wall. Bar equals 50m.

1951, *Shinners 13027* (BRIT/SMU). **Hood Co.**: 10 mi NE of Granbury, limestone slope above stream, under trees, in leaf mold and silt, 1 May 1949, *Shinners 11036* (BRIT/SMU). **Kendall Co.**: 2.4 mi S on FR 289 (Welfore-Waring Rd.) from its jct. with the "T" in Waring, NW of Boerne, open mesic disturbed roadside with calcareous soil and limestone rocks, 27 Apr 1991, *S. & G. Jones 7380* (BRIT/SMU, ctb, MICH, MO, SAT, TAES, TEX, US, VDB, WARM). **Kerr Co.**: 10.8 mi SW from Hunt on TX 39 from its jct. with FR 1340, mesic riverine habitat along W side of the South Fork of the Guadalupe River, 11 May 1991, *Jones 6670 and Kral* (BRIT/SMU, ctb, MICH, MO, SAT, TAES, TEX, US, VDB, WARM). **Kimble Co.**: ca. 20 mi SW of Junction, valley of Paint Creek near its jct. with South Fork of Llano River, forest of large oaks, walnuts, and pecans, 11 May 1947, *McVaugh 8278* (CAS, NA, TEX). **Lampasas Co.**: 4.1 mi E on FM 580 from its jct. with FM 581, infrequent, 20 Apr 1988, *S. & G. Jones 1268* (TAES). **Llano Co.**: ca. 9 mi W of Buchanan Dam, on the road between Burnet and Llano, 29 Apr 1946, *Lundell 14563* (TEX). **McClennan Co.**: vicinity of China Spring, limestone hills, 15 Apr 1970, *Mauldin s.n.* (BRIT/SMU). **Mills Co.**: 8 mi SW of Goldthwaite, creek bank, in shade, sand and limestone gravel, 30 Apr 1960, *Shinners 28312* (BRIT/SMU). **Palo Pinto Co.**: 2.3 mi S on FR 4 from its jct. with FR 3137, S of Palo Pinto, mesic live oak W-facing hillside slope with reddish sandy loam soil and sandstone, 23 Apr 1992, *S. & G. Jones 8349* (Type series: BRIT/SMU, ctb, MICH, MO, SAT, TAES, TEX, US, VDB, WARM). **Parker Co.**: 9.5 mi E of Weatherford, clayey limestone soil near pond, in shade, 24 Apr 1949, *Shinners 10963* (BRIT/SMU). **San Saba Co.**: on Ellison Ranch, at Chapel, low, wet, shaded area by pool below natural waterfall, at edge of water, growing in black soil, 24 Apr 1977, *Barnette 256* (BRIT/SMU). **Somervell Co.**: 1 mi NE of Glen Rose on Hwy 67, sandy stream bank, in thicket, 2 Apr 1950, *Shinners 12157* (BRIT/SMU). **Sutton Co.**: Sonora, experiment station, 21 Apr 1931, *Jones*

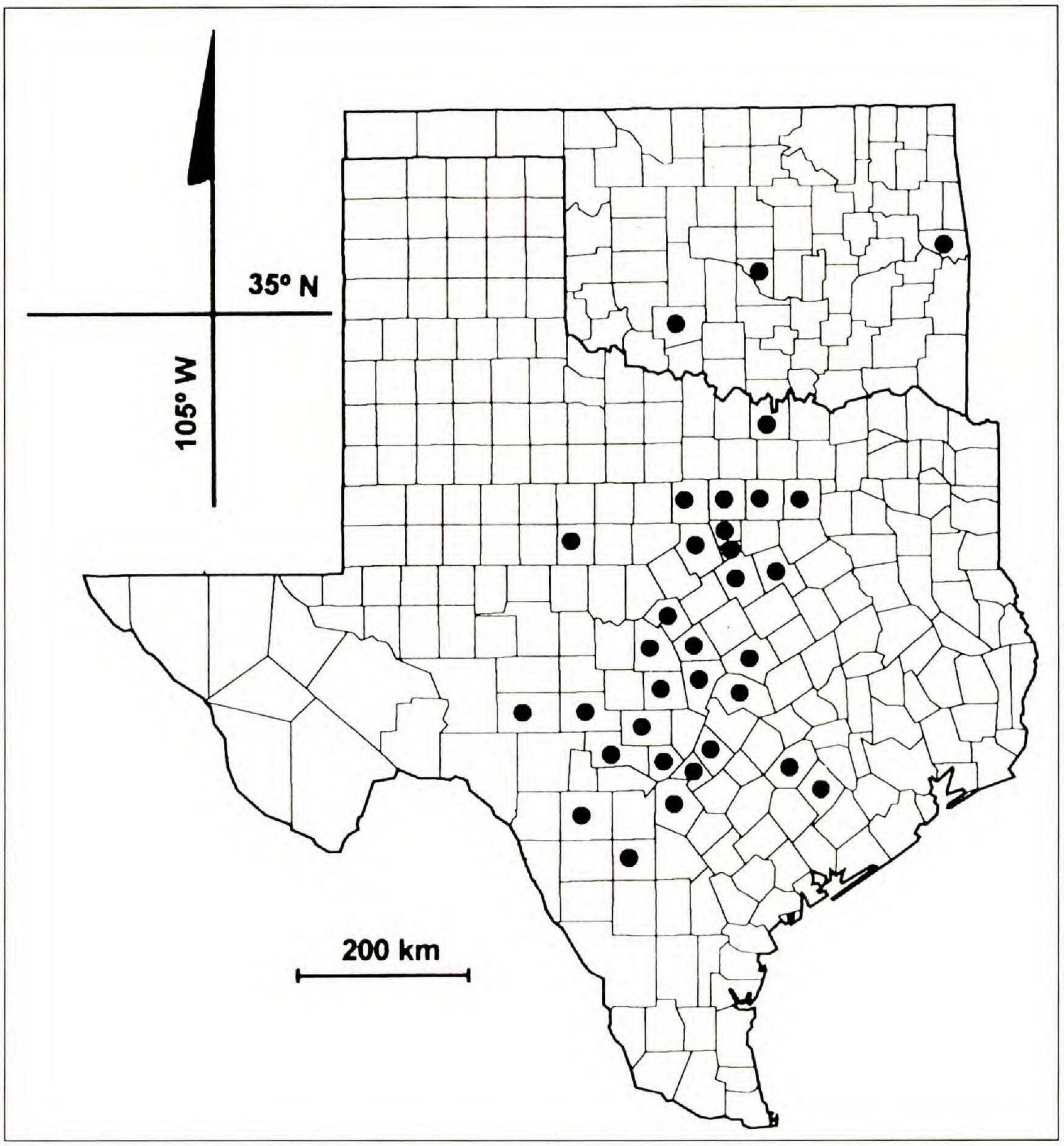

FIG. 5. *Carex perdentata*, distribution by county based on annotated herbarium specimens.

28383 (UC). **Tarrant Co.**: Sycamore Park, NW of East Rosedale St. and South Beech in Fort Worth, mesic creek meander through open woods with loamy clay soil, 23 Apr 1992, *S. & G. Jones 8339* (BRIT/SMU, ctb, MICH, MO, SAT, TAES, TEX, US, VDB, WARM). **Taylor Co.**: Abilene State Park, in deciduous woods along Elm Creek, 28 May 1943, *Tolstead 7330* (OMA, UC). **Travis Co.**: 0.2 mi SW on the Andrandok Trail with its jct. with Loop 390 in Bull Creek Park, Austin, S side of Bull Creek on N-facing slope of a juniper-oak woodland, 7 Apr 1990, *S. & G. Jones 4225* (BRIT/SMU, ctb, MICH, MO, SAT, TAES, TEX, US, VDB, WARM). **Uvalde Co.**: near Uvalde, woods along Leona River, 30 Apr 1928, *Palmer 33641* (UC). **Williamson Co.**: Georgetown near dam on San Gabriel River, alluvial soil, partial shade, 14 Apr 1947, *Whitehouse 18073* (BRIT/SMU).

The following dichotomous key is for the taxa of section *Phaestoglochin* occurring in Arkansas, Louisiana, Oklahoma, and Texas. Incomplete veins refer to veins that do not extend from the base of the perigynium to the apex. Septate-

nodules refer to cross-veins. Dorsal and ventral are used synonymously with abaxial and adaxial respectively.

KEY TO THE SPECIES OF SECTION *PHAESTOGLOCHIN* IN ARKANSAS, LOUISIANA, OKLAHOMA, AND TEXAS

1. Leaf sheaths baggy around the culm (loose) 2
   2. Apex of ventral leaf sheath straight or slightly concave, not callused or only slightly thickened, friable; dorsal leaf sheath white or pale green with darker green veins with darker green septate-nodules, but not green,mottled with white, frequently with scattered red dots ventrally; perigynia turning stramineous to brown at maturity; perigynia (3.4–)3.5–5.6 mm long ..... *C. gravida*
   2. Apex of ventral leaf sheath concave, callused or not, friable or not; some dorsal leaf sheaths white or pale green with darker green veins and darker green septate-nodules with some dorsal sheaths green, mottled white, without scattered red dots ventrally; perigynia remaining green at maturity; perigynia 3.3–4.6 mm long 3
      3. Spikes of inflorescence aggregated, apex of ventral leaf sheath concave, slightly to strongly callused, not friable; awns of most pistillate scales reaching or exceeding the base of the perigynium beak; beaks 1.0–1.8(–2.0) mm long; widest leaves (3.0–)3.5–5.0(–6.0) mm wide; perigynia (3.4)3.6 4.5 mm long ..... *C. aggregata*
      3. Spikes of inflorescence separated, internodes between spikes frequently much greater than the length of the spikes; apex of ventral leaf sheath concave but not callused, friable; awns of most pistillate scales shorter than the base of the perigynium beak; beaks 0.8–1.0(–1.2) mm long; widest leaves (4–)5–10 mm wide; perigynia 3.3–4.0(–4.3) mm long ..... *C. sparganioides*
1. Leaf sheaths tight around the culm (not baggy) 4
   4. Lowest inflorescence bract 5.5–25 cm long, greatly exceeding the inflorescence, two to many times as long 5
      5. Culms smooth below inflorescence; plants of open bottlomlands or floodplain habitats ..... *C. arkansana*
      5. Culms antrorsely scaberulous below inflorescence; plants of open mesic to submesic woodlands ..... *C. perdentata*
   4. Lowest inflorescence bract less than 5.5 cm long, not exceeding the inflorescence, or less than two times as long 6
      6. Pistillate scales brown with a contrasting green mid-stripe ..... *C. occidentalis*
      6. Pistillate scales hyaline, hyaline tinged with yellow or green, or pale yellow to stramineous with a green or greenish mid-stripe, but not brown with a contrasting green mid-stripe 7
         7. Beaks of perigynia smooth, not serrated; perigynia spongy at base at maturity 8
            8. Perigynia ovate-deltoid; veinless ventrally, perigynia spongy at base but without a swollen spongy area at base on ventral surface ..... *C. leavenworthii*
            8. Perigynia ovate-lanceoid; veins present on ventral surface, at least proximally over an enlarged spongy area at base of perigynia 9
               9. Perigynia 1.3–1.8 mm wide; widest leaf blade 1.5– 3.0 mm wide ..... C. retroflexa

9. Perigynia 1.0–1.3 mm wide; widest leaf blade 1.0–1.5 mm wide ..... C. texensis
7. Beaks of perigynia serrated, not smooth; perigynia spongy or not at base at maturity 10
10. Perigynia spongy at base with or without a ventral swollen area basely 11
11. Perigynia (1.4–)1.5–2.7(–2.8) mm wide, ovate-deltoid or conspicuously ovate; perigynia without a swollen spongy area at base on ventral surface 12
12. Perigynia 2.2–3.2(–3.3) mm long; veinless ventrally; 0(–3) veins dorsally ..... *C. leavenworthii*
12. Perigynia (3.3–)3.4–5.2(–5.6) mm long; 0–5(–8) narrow veins (ca. 0.1–0.2 mm wide) ventrally; 0–10(–11) narrow veins dorsally ..... *C. perdentata*
11. Perigynia 0.9–1.8 mm wide, ovate-lanceoid or slightly ovate oblong; perigynia with a swollen spongy area at base of ventral surface 13
13. Perigynia (3–)4–5 times as long as wide; with rhizomes ± elongate ..... *C. socialis*
13. Perigynia 3 or less times as long as wide; without elongate rhizomes 14
14. Widest leaf width 1.3–1.9 mm wide; stigmas straight or only slightly coiled ..... *C. radiata*
14. Widest leaf width 1.8–2.6 mm wide; stigmas once to twice coiled ..... *C. rosea*
10. Perigynia not spongy at base 15
15. Abaxial and adaxial leaf surface smooth, not minutely papillose (sandpaper-like), except sometimes sparingly along major veins 16
16. Perigynia (3.4–)3.5–4.7 mm long, (2.0–)2.1–2.7(–3.1) mm wide 17
17. Apex of the ventral leaf sheath straight or slightly concave not callused or only slightly thickened, friable; frequently with scattered reddish dots; dorsal leaf sheath white or pale green with darker green veins with darker green septate-nodules, but not green, mottled with white; perigynia turning stramineous to brown at maturity; widest leaves (3–)4–8 mm wide; most culms forming greater than 70° angle with the ground ..... *C. gravida*
17. Apex of ventral leaf sheath concave, callused, not friable; without scattered reddish dots; all dorsal leaf sheaths green, or if white or pale green with darker green septate-nodules, then some sheaths green mottled with white; perigynia turning stramineous to brown at maturity or remaining green; widest leaves 2.5–6.0 mm wide; culms either forming less than a 50° angle or greater than a 70° angle with the ground 18
18. Dorsal leaf sheaths green; perigynia frequently turning stramineous to brown at maturity; widest leaves 2.5–4.5 mm wide; most culms forming less

than a 50° angle with the ground, usually much less; many bract and/or pistillate scale awns greatly exceeding the perigynia beaks ..... *C. austrina*

18. Some dorsal leaf sheaths white or pale green with darker green veins and darker green septate-nodules, but some sheaths green mottled with white; perigynia remaining green at maturity; widest leaves (3.0–)3.5–5.0(6.0) mm wide; most culms forming an angle greater than 70° with the ground; most bract and/or pistillate scale awns not exceeding the apex of the perigynia beaks, occasionally a few bract awns surpass the beaks ..... *C. aggregata*

16. Perigynia 2.0–3.5 mm long, 1.3–2.3(–2.4) mm wide 19

19. Perigynia bodies ovate-deltoid; perigynia beaks 0.3–0.7(–0.8) mm long with a single row of serrations, abruptly arising from the apex of the perigynium; widest leaf blade 1.1–3.0(–4.0) mm wide; leaves per fertile culm 2–6(–7); culm width, ca. 2 cm above rootstock, 1.0–2.4(–3.5) mm wide; pistillate scale (1.3–)1.5 2.2 (–2.5) mm long; pistilate scale awn 0–0.8(–1.0) mm long; dorsal leaf sheath frequently green mottled with white dots ..... *C. leavenworthii*

19. Perigynia bodies ovate or suborbicular; perigynia beaks 0.8–1.1 mm long with a double row of serrations, gradu ally tapering from the shoulder of the perigynium; widest leaf blade (1.9)2.5–4.4 mm wide; leaves per fertile culm (4–)5–8; culm width, ca. 2 cm above rootstock, 1.7–3.2(–3.3) mm wide; pistillate scale 1.1–1.7(–1.9) mm long; pistillate scale awn 0–3.2 mm long; dorsal leaf sheath mostly green, infrequently green mottled with white dots ..... *C. cephalophora*

15. Abaxial, adaxial, or both leaf surfaces minutely papillose (sand paper-like), at least near distal end 20

20. Inflorescence capitate, 12–19 mm long, 9–14 mm wide; leaves conspicuously shorter than culm, (6.5–)8.4–21.0 (–23.0) mm long; ventral surface of perigynia veinless, dorsal surface veinless or rarely with 1–4 incomplete narrow veins (ca. 0.1–0.2 mm wide) ..... *C. mesochorea*

20. Inflorescence short-oblong, oblong, or linear, (12.0–)13.5–47 mm long, 6.0–18.0(–28.0) mm wide, the central axis visible, at least between some spikes, usually the lowest two; leaves short or long, 11.3–46.4(–55.5) mm long; ventral surface of perigynia 0–15-veined, dorsal surface 0–12-veined 21

21. Ventral surface of perigynia with (5–)6–15 conspicuous broad veins (ca. 0.5 mm wide); dorsal surface with (0–) 1–12 broad veins ..... *C. muehlenbergii* var. *muehlenbergii*

21. Ventral surface of perigynia with 0–6(–8) narrow veins (ca. 0.1–0.2 mm wide); dorsal surface with 0–11(–14) narrow veins 22

22. Pistillate scales 3.0–4.2(–4.3) mm long, (1.0–)1.6–2.6(–3.0) mm wide; mid-stripe 3-veined, rarely 1-veined; culms usually forming an angle of 50° or less with the ground ..... *C. austrina*

22. Pistillate scales (1.5–)1.8–3.1 mm long, (1.0–)1.2–1.8(–2.2) mm wide; mid-stripe 1-veined, occasionally 3-veined; culms usually forming an angle of 70° or more with the ground 23

23. Beaks of perigynia 0.2–0.6(–1.0) mm long, abruptly arising from apex of perigynium; perigynia broadly ovate, (1.5–)2.5–3.8 mm long; dorsal leaf sheaths frequently green with mottledwhite dots; plants wide spread, from Texas east to Georgia and north to Canada ..... *C. muehlenbergii* var. *enervis*

23. Beaks of perigynia (1.0–)1.4–1.7(–1.8) mm long, tapering from shoulders or occasionally abruptly arising from apex of perigynia; perigynia ovate or ovate-deltoid, 3.2–5.2(–5.6) mm long; most dorsal leaf sheaths infrequently mottled with white dots; plants restricted to central Texas north to Oklahoma ..... *C. perdentata*

This treatment does not recognize varieties of *Carex gravida*. However, further research may prove that infraspecific taxa are warranted [i.e., *C. gravida* var. *lunelliana* (Mackenzie) F.J. Hermann], but until that time, I have opted for a more conservative approach. In floras where *C. gravida*, *C. aggregata*, and *C. sparganioides* occur together, they have classically been separated from other members of section *Phaestoglochin* by having baggy sheaths. However, I have encountered specimens of *C. gravida* and *C. aggregata*, both in the field and on herbarium sheets, that have tight leaf sheaths. It is possible that a single recessive gene is responsibile for tight leaf sheaths, or developmental through ontogeny. Another plausible explanation provided by A.A. Reznicek [(**MICH**) pers. comm.] is that the individuals with tighter leaf sheaths are growing in less than optimum habitat. Regardless, *C. gravida* and *C. aggregata* usually have baggy leaf sheaths but can have tight leaf sheaths so they key out under baggy and tight leaf sheaths.

The classical spelling of *C. muhlenbergii* should be corrected to *C. muehlenbergii*. This was pointed out by Peter Ball [(TRTE) pers. comm.]. Willdenow's original spelling was *C. mühlenbergii* with a diacritical sign (an umlaut over the "u"). Greuter et al. (1988), Article 73.6 state that diacritical signs are not used in Latin plant names. In names which are drawn from words in which such signs appear, the signs are to be suppressed with the necessary transcription of the letters so modified (i.e., ü becomes ue).

Carex perdentata's closest putative relative is *C. mesochorea*. *Carex perdentata* differs in having longer perigynia with their bases slightly spongy, slightly nar-

rower and conspicuously longer leaves, usually longer inflorescences, more spikes per inflorescence but with fewer perigynia per spike, and for the most part, longer anthers. The teeth of the beaks of *C. perdentata* are noticeably longer and spreading at maturity in contrast to the short and usually straight teeth of *C. mesochorea* which rarely reach 1 mm long. The species epithet "perdentata" refers to the conspicuous teeth on the beaks of the perigynia.

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REFERENCES

DUMORTIER, B.C. 1827. Florula Belgica, Operis Majoris, Prodromus. Staminacia, Tournay (J. Casterman). P. 146.

GREUTER, W., ET AL. 1988. Chairman. International Code of Botanical Nomenclature, adopted by the Fourteenth International Botanical Congress. Koeltz Scientific Books, Berlin.

KÜKENTHAL, G. 1909. Cyperaceae: Caricoideae. Das Pflanzenreich, IV, 20 (Heft 38):296–353. W. Engelmann, Leipzig, Germany.

KUNTH, C.S. 1837. Cyperographis synoptica sive Enumeratio Cyperacearum. Vol. 2. Enumeratio Plantarum. Stutgardiae et Tübingae. Pp. 378–381.

MACKENIZIE, K.K. 1931. North American Flora. 18. Cyperaceae, tribe 2, *Caricae*. New York Botanical Garden, Bronx, NY.

PAX, F. 1889. Cyperaceae In: Engler und K. Prantl. Die natürlichen Pflanzenfamilien. W. Englemann, Leipzig, Germany. Pp. 98–130.

REZNICEK, A.A. and P.W. BALL. 1980. The taxonomy of *Carex* section *Stellulatae* in North American and North of Mexico. Contr. Univ. Michigan Herb. 14:153–203.